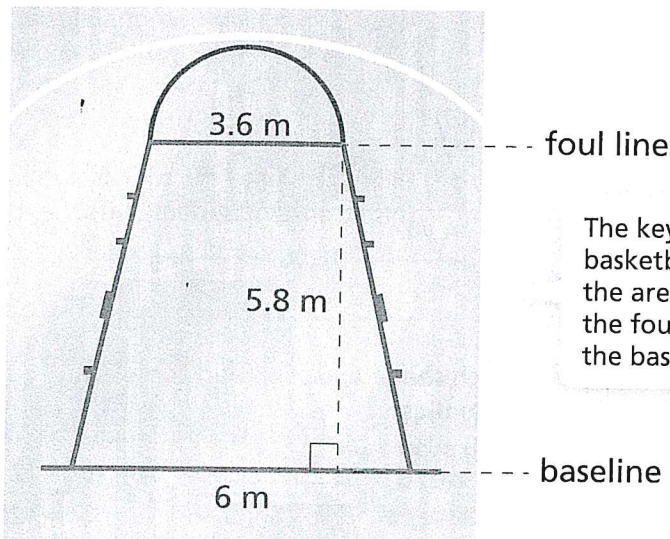


Explain It!



The European basketball key was changed from a trapezoid shape to a rectangle in 2010. The diagram shows the shape of the key before 2010 outlined in blue.



The key on a basketball court is the area between the foul line and the baseline.

A. Construct Arguments Tim finds the area of the key by multiplying the base by the height. Does his strategy make sense?

B. Use Structure How could Tim find the area of the trapezoid by decomposing it into shapes he knows? What is the area of the key?

Lesson 7-3

Find Areas of Trapezoids and Kites

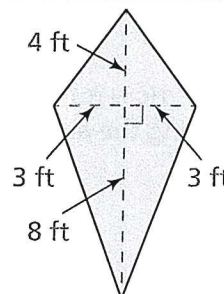


I can...
find areas of trapezoids and kites.

MAFS.6.G.1.1 Find the area of... special quadrilaterals... by... decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems. Also 6.EE.1.2c
MAFS.K12.MP.1.1, MP.3.1, MP.6.1, MP.7.1

Focus on math practices

Use Structure How can you find the area of this kite? Explain.

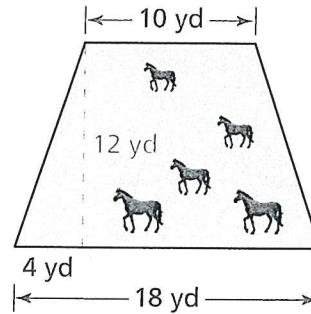




EXAMPLE 1 Find the Area of a Trapezoid



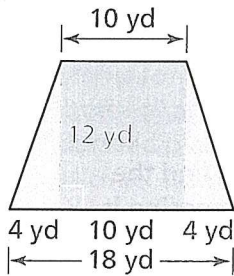
The pasture is in the shape of a trapezoid. What is the area of the pasture?



Be Precise What are the properties of a trapezoid and how can they help you to find the area of a trapezoid?

Decompose the trapezoid into a rectangle and two right triangles.

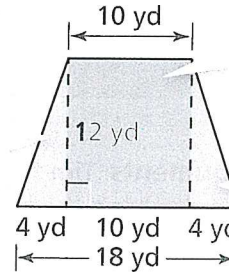
Find the area of each shape and then add the areas. The triangles are identical.



Find the length of any unknown base or height.

$$\leftarrow 18 - (4 + 10) = 4$$

$$A = \frac{1}{2}bh = \frac{1}{2} \times 4 \times 12 = 24 \text{ yd}^2$$



$$A = \ell w = 12 \times 10 = 120 \text{ yd}^2$$

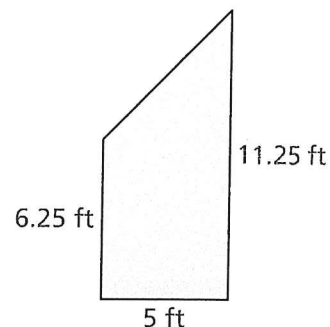
$$A = \frac{1}{2}bh = \frac{1}{2} \times 4 \times 12 = 24 \text{ yd}^2$$

Add the areas: $24 + 120 + 24 = 168$

The area of the pasture is 168 yd^2 .

Try It!

How would you decompose this trapezoid to find its area? Find the area of the trapezoid.



Convince Me! How is finding the area of the trapezoid in Example 1 different from finding the area of the trapezoid in the Try It!?



EXAMPLE 2



Find the Area of a Different Trapezoid



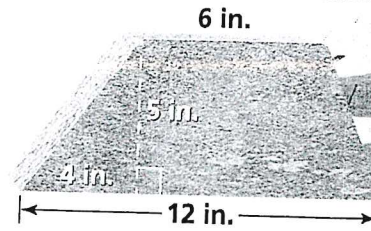
ACTIVITY



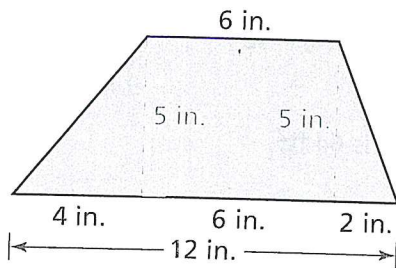
ASSESS

A builder needs to cut one stone in the shape of a trapezoid to fit in the space. What is the area of the front side of that stone?

Look for Relationships When you decompose a trapezoid into a rectangle and two triangles, the triangles are not always identical.



Draw lines to show the rectangle and the two triangles. Label needed measurements.



The triangles have different bases.

Find the areas:

$$\text{Triangle: } A = \frac{1}{2}bh = \frac{1}{2}(4 \times 5) = 10$$

$$\text{Rectangle: } A = \ell w = 6 \times 5 = 30$$

$$\text{Triangle: } A = \frac{1}{2}bh = \frac{1}{2}(2 \times 5) = 5$$

Add the areas:

$$10 \text{ in.}^2 + 30 \text{ in.}^2 + 5 \text{ in.}^2 = 45 \text{ in.}^2$$

The area of the side of the stone is 45 in.^2 .

EXAMPLE 3



Find the Area of a Kite

Jackson has a rectangular piece of cloth that has an area of 298 cm^2 . Does Jackson have enough cloth to make the kite shown?

STEP 1 Decompose the kite into two identical triangles. Find the area of the triangles.

$$A = \frac{1}{2}bh$$

$$A = \frac{1}{2} \cdot 30 \cdot 10$$

$$A = 150 \text{ cm}^2$$

Each triangle has an area of 150 cm^2 .
The area of the kite is 300 cm^2 .

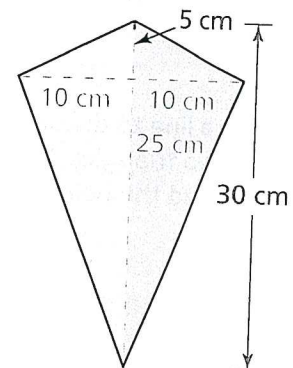
STEP 2 Find the area of the kite. Compare the area of the kite to the area of the cloth.

$$2 \times 150 \text{ cm}^2 = 300 \text{ cm}^2$$

$$300 \text{ cm}^2 > 298 \text{ cm}^2$$

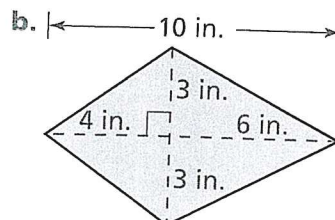
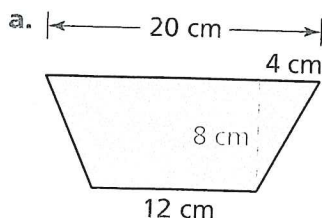
Jackson does not have enough cloth to make the kite.

A kite is a quadrilateral with two pairs of adjacent sides that are equal in length.



Try It!

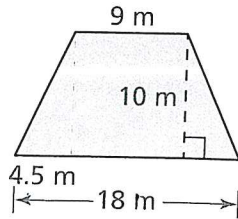
Find the area of the trapezoid and the area of the kite.





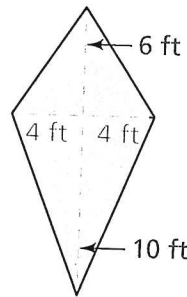
You can find the area of a trapezoid or a kite by decomposing the shapes into rectangles and triangles.

Trapezoid



Decompose the trapezoid into two triangles and a rectangle. Find the length of the unknown triangle base.

Kite



Decompose the kite into two identical triangles.

Each triangle: $A = \frac{1}{2}(4.5)(10) = 22.5$

Rectangle: $A = 9(10) = 90$

Trapezoid: $A = 22.5 + 22.5 + 90 = 135$

The area of the trapezoid is 135 m^2 .

Each triangle: $A = \frac{1}{2}(16)(4) = 32$

Kite: $A = 32 + 32 = 64$

The area of the kite is 64 ft^2 .

Do You Understand?

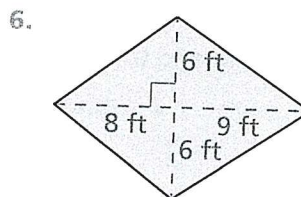
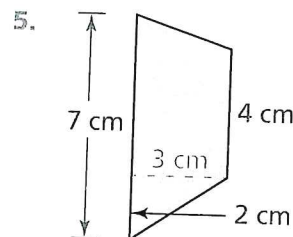
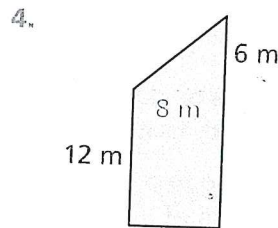
- Essential Question** How can you find the areas of trapezoids and kites?

- Draw a line to divide the pasture in Example 1 into two triangles. What are the measures of the bases and the heights of the two triangles?

- Construct Arguments** In Example 3, how could you use 4 triangles to find the kite's area?

Do You Know How?

In 4–6, find the area of each trapezoid or kite.



Name: _____



PRACTICE



TUTORIAL

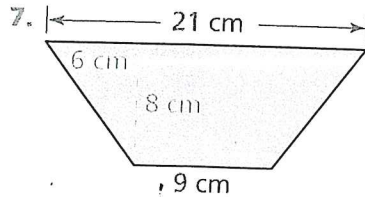
Practice & Problem Solving



Scan for
Multimedia



Leveled Practice In 7–12, find the area of each trapezoid or kite.



Each triangle:

$$A = \frac{1}{2}bh$$

$$= \frac{1}{2} \times \quad \times 8$$

$$= \quad \text{cm}^2$$

Rectangle:

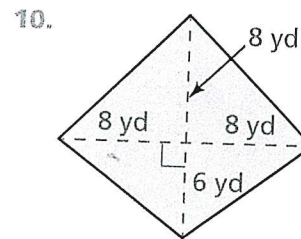
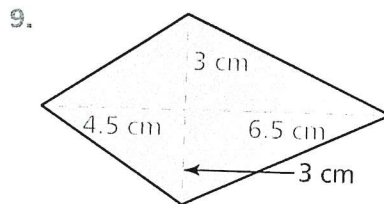
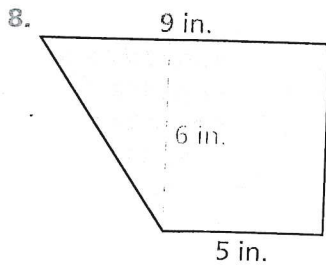
$$A = lw$$

$$= \quad \times 8$$

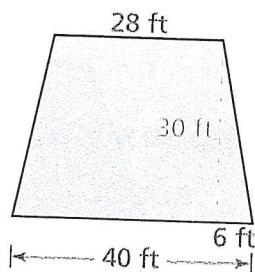
$$= \quad \text{cm}^2$$

Trapezoid:

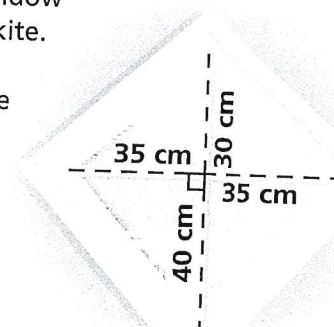
$$A = \quad + \quad + \quad = \quad \text{cm}^2$$



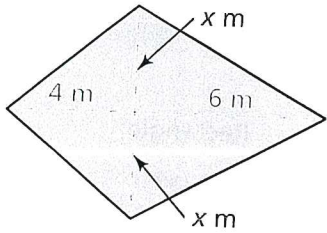
11. A sidewall of a building is shown below.
What is the area of the wall?



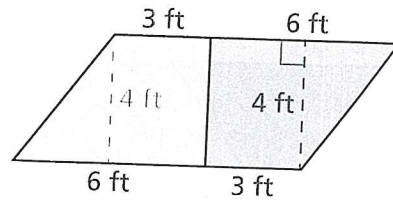
12. **Be Precise** The window has the shape of a kite.
How many square meters of glass were used to make the window?



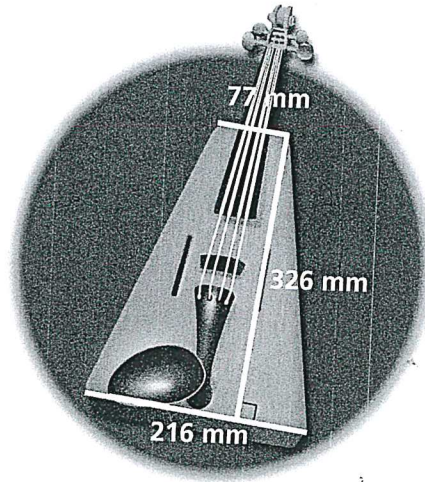
13. The area of the kite is 30 m^2 . What is the value of x ? Explain.



14. **Make Sense and Persevere** Hunter drew two identical trapezoids and composed them to form a parallelogram. Use the area of the parallelogram to find the area of one trapezoid. Explain.



15. **Higher Order Thinking** A craftsman wants to build this symmetrical fiddle. He needs to know the area of the face of the fiddle. How could he use the measurements shown to find the area? Use your strategy to find the area of the face of the fiddle.



The figure is symmetrical because it can be divided into two halves that fit exactly on top of each other.

Assessment Practice

16. Marique is making a large table in the shape of a trapezoid. She needs to calculate the area of the table. The longest side of the table is twice as long as the table's width. Find the area of the table by decomposing the trapezoid into familiar shapes. Show your work. 6.G.1.1

